DOCUMENT RESUME

ED 069 206 HE 003 528

TITLE	Brief to the Committee on University Affairs. Estimates of Operating Grant Requirements for 1970-71.
INSTITUTION	Committee of Presidents of Universities of Ontario, Toronto.
PUB DATE	3 Mar 70
NOTE	56p.; Revised on March 3, 1970
EDRS PRICE	MF-$0.65 HC-$3.29
DESCRIPTORS	*Cost Effectiveness; *Educational Economics; *Educational Finance; Enrollment Projections; *Financial Problems; *Higher Education; International Education; Statewide Planning

ABSTRACT

This brief contains a refinement and amplification of preliminary estimates of operating fund requirements of the provincially assisted universities of Ontario for 1970-71. Part B of the report contains quantitative descriptors of university operations including budgeted operating expenditures for 1969-70, faculty income unit ratios in 1969-70, and some exploratory studies on quality and cost of education. Part C presents an historical resume and projections of enrollment and its financial implications for 1970-71. Part D defines some problems of enrollment forecasting in relation to income determination, and Part E presents projected increases in cost components in 1970-71. (HS)

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A. SUMMARY

This brief contains a refinement and amplification of our October preliminary estimates of operating fund requirements of the provincially assisted universities of Ontario for 1970-71. We now have 1969-70 anticipated actual data on enrolments, staff, and expenditures on various categories of goods and services, and 1970-71 enrolment projections.[1/]

In section B we document many of the subjective impressions of the October report. Despite considerable budgetary stringency, there does not appear to have been a deterioration in the overall staff to weighted enrolment ratio. The constancy of this ratio could be said to reflect the determination of the university system not to allow deterioration in this crucial aspect of university functioning. The alternative result, however, has been an increase in the percentage of the budget devoted to academic salaries because of the magnitude of salary increases it was necessary to award. The corresponding decreases in percentage of the budget available for other expenditures, particularly library acquisitions, is a cause of concern.

This section concludes with a brief report of exploratory studies in which we have begun to develop improved measures of quality and cost in university operations.

Section C begins with a refinement of the earlier analysis of funding of the Ontario university system from 1967-68 to 1969-70. We point out that the changes in the relationship of formula

1/ The analyses presented herein have of necessity been based on data submitted to DUA but not yet verified by them.

grants, fee income, and special grants can mask the real trends in funding. In 1969-70, although there was an apparent 5.5% increase in the value of the unit, this resulted in only a 2.8% increase in total grants per student, and a 2.4% increase in total income. Such increases are clearly insufficient to cover inflationary cost increases.

Our revised estimate of enrolment for 1970-71 is 126,000 students contributing 219,000 units. A table is presented translating these figures into operating income at various hypothetical levels of increase to the value of the income unit. Growth in the student population alone will account for a 14% increase in total grants required, at the most likely level of enrolment.

Our analyses of enrolments and their financial implications point up both the virtues and the problems inherent in the operating formula system as presently constituted. Section D discusses certain problems and suggests a joint examination by CPUO and CUA of possible ways in which the formula might evolve to the greater satisfaction of both the universities and the government.

The section on increases in university costs has been considerable modified for several reasons. The analysis of academic salaries is based on a different approach which has evolved in the course of our studies in this area. The approach is also influenced by the imminence of the joint CUA/OCUFA/CPUO salary study. Estimates of costs in other areas has been made more difficult because of the availability of less financial data for 1969-70 than has been the

case in the past. The total estimated increase in unit costs for 1970-71 is 9.13%.

Throughout the report, we indicate the areas in which the expanded research effort of the CPUO secretariat, in conjunction with the proposed data bank, will make available over the next several years more solid information on which to base such estimates as we have derived in this brief.

As was the case in the reports of the last two years, we base our calculations of staff/income unit ratios and components of expense on the emerged universities, since unit values under the formula are designed to provide for their needs, supplementary grants being given to cover additional costs of the emerging universities. Trends in the emerging universities are also of interest however, and in some cases we show statistics on these institutions also.

The magnitude of the supplementary grants and the procedures for determining progress towards emergence are matters of continuing concern, and the exclusion of such considerations from the present brief was determined solely by the scope of the central task. We hope that there will be a satisfactory resolution of the current discussions on emergent universities between CPUO and CUA. It must not be forgotten that one of the main factors in the success of the operating formula is the appropriateness of its application. If it is applied to circumstances for which it was not designed (e.g. an institution of a size not viable under the formula, no matter what the age of that institution), the resulting hardships cannot but reflect unfavourably upon the entire formula system, and undermine the confidence of all parties in its equitability.

Apart from the questions raised about the level of support for the emerging universities, we estimate a need for a total increase in basic operating income of $73 million dollars, composed of $42 million for increased units and $31 million for increased unit costs. Taking projected fee income and special grants into account, we estimate a total requirement for operating grants of $326 million dollars.

It is also essential to bear in mind that enrolment growth can be constrained by limitations on available space. In view of the capital provisions foreseen for the next several years such constraints may very well materialize. Within the next month, we will be presenting our views on the application of the interim capital formula for 1970-71.

B. QUANTITATIVE DESCRIPTORS OF UNIVERSITY OPERATIONS

This section presents analyses which reflect the budgetary priorities established by the universities in the light of the value of the basic income unit set for 1969-70. The distribution of budgeted expenditures by major categories is examined, and the academic component further explicated by data on staff/income unit ratios. For reasons noted below, 1968-69 is the only year available for comparison. We also report the beginning of exploratory studies on other parameters of quality and cost.

B-1 Budgeted Operating Expenditures for 1969-70

Budgeted operating expenditures by categories of expense for 1969-70 are presented in Table B-1.1 with comparisons to 1968-69 actuals. This table is based on an analysis of CAUBO/DBS financial returns, which utilize somewhat different breakdowns than the previous DUA reporting forms. We thus cannot relate these figures back to previous years. Also, comparisons of the two years must be made with some caution. First, the effect of deviations of enrolment from projections has not yet been incorporated. Experience has shown that additional income produced by enrolment overruns is not generally distributed in the same fashion as budgeted income. Second, the emerged universities group includes two additional institutions in 1969-70, Guelph and York. The analysis set out below has included examination of the effects of this.

TABLE B-1.1

BREAKDOWN OF COMPONENT EXPENSES PER INCOME UNIT IN 1968-69 AND 1969-70 AND PERCENTAGE CHANGE FROM 1968-69*

	1968-69 Expense per Income Unit and % of Total			1969-70 Expense per Income Unit and % of Total			Percentage Change From 68-69 to 69-70	
	$		%	$		%	%	
Academic Salaries#	624.9		40.5	664.4		41.8	6.3	
Pension & Other Fringe Benefits - Academic	57.8		3.7	66.2		4.2	14.6	
Subtotal	682.7		44.2	730.6		46.0	7.0	
Support Staff Salaries	173.1		11.2	181.8		11.4	5.0	
Library Staff Salaries	67.4		4.4	69.3		4.4	2.8	
Library Books & Periodicals	55.4		3.6	47.1		3.0	-15.0	
Other Library Expenses	16.0		1.0	18.5		1.2	15.4	
Other Academic Expenses	174.5		11.3	181.5		11.4	4.0	
Subtotal of Academic Expenses		1169.1	75.8		1228.7	77.3		5.1
Student Services	18.7		1.2	27.3		1.7	45.7	
Administrative Expenses Including Salaries	107.2		7.0	111.5		7.0	4.0	
Maintenance Expenses Including Salaries	195.3		12.7	194.7		12.2	- 0.3	
Miscellaneous Expenses	51.6		3.3	27.2		1.7	-47.2	
Subtotal of Above Four Components		372.8	24.2		360.7	22.7		- 3.3
Grand Total		1541.9	100.0		1589.4	100.0		3.1
Less Special Grants/Income Unit		91.9			59.4			-35.4
Actual Value of the Income Unit		1450.0			1530.0			5.5

*Data for 1969-70 include two additional universities, Guelph and York, in the emerged group.

#Includes full-time and part-time staff, student teaching, demonstrating, and marking, etc.

In the preliminary brief, we remarked upon the budgetary "squeeze" occasioned by the magnitude of academic salary increases the universities found it necessary to grant, as compared with the increase in the value of the income unit. The conclusion was that this must have led either to a diversion of funds from other components of expenditure or a deterioration in staff/student ratios. Table B-1.1 reveals that the former effect has taken place: academic salaries rose from 40.5% to 41.8% of the budgets of the emerged universities. Including fringe benefits, the academic salary portion increased from 44.2% to 46.0% of the budget.

One area of academic expense which suffered a compensating reduction must be viewed with some alarm. The percentage devoted to the purchase of library books and periodicals declined from 3.6 to 3.0%, a startling reduction. In view of the continuing exponential growth of scholarly production which has been estimated by some at 10% per annum,and per volume cost increases in the neighbourhood of 10%, the libraries of the universities of Ontario appear to be losing considerable ground in 1969-70. While sharing of resources amongst members of the university system would be expected to realize some economies, this sharing has not yet developed to an extent which would compensate for this to any great degree.

Over the next several years, however, we should begin to see economies resulting from the various efforts devoted to raticnalizing the planning and utilization of library resources A research and planning office for the Ontario universities bibliographic centre project has been established. The Ontario

Council of University Librarians is currently reviewing a draft report on projections of library resource requirements to 1975. The CPUO research staff are working with the Special Subcommittee on Assessment of Graduate and Research Library Requirements on the development of alternative ways to collect data upon which library needs may be objectively determined. Sampling studies of user demand, thesis citations, book-use, and duplication are being considered. We are also exploring ways to quantify the less direct services provided by a library, such as its function in attracting new faculty and students, and also in attracting sponsored research.

Total academic expenses have risen from 75.8% in 1968-69 to 77.3% in 1969-70, despite the reduction in library expenditure. There is an obvious question to be asked here. Is it not a good thing that the percentage of the budget devoted to directly academic expenses, particularly academic salaries, has increased? Clearly, this is not necessarily a beneficial shift, since the academic/non-academic dichotomy is an artificial one, convenient for some purposes, but if pushed too far, misleading. Supportive services are essential to the health of any organization, and the university is no exception here. A number of the presidents' comments cited in the preliminary brief indicated a serious concern that many of our institutions feel unable to devote a sufficient portion of the budget to "non-academic" functions.

There is evidence of a squeeze, then, as a result of the increment in unit value granted last year, which has manifested itself in an increasing proportion of the budget being devoted to

academic salaries, with corresponding reductions in other areas, notably purchase of library books and expenditures in non-academic areas of university operations.

B-2 Faculty/Income Unit Ratios in 1969-70

Table B-2.1 shows several statistics relating to numbers of faculty and income units for 1968-69 and 1969-70 in the emerged universities. Because of the effect of those institutions which emerged in 1969-70, the statistics for that year are shown both including and excluding those institutions. As was noted in the December 1968 brief, changes in reporting of faculty in 1968-69 precludes accurate comparisons with earlier years.

Our past studies have indicated that full-time equivalent staff to income unit ratios appear to be the most meaningful measure of the utilization of staff resources. In 1968-69, this ratio was 1:25.0 for the emerged universities, as calculated from final statistics on staff and income units. The ratio cited in our December 1968 brief was 1:24.5, calculated from anticipated actuals. This difference illustrates again the difficulty in comparing actual with budgeted figures.

The 1969-70 ratio, calculated on budgeted staff and anticipated actual income units, is 24.4 including the recently emerged universities and 24.8 excluding them. The difference from 1968-69 appears to be within the range of expectable deviation between estimates and actuals, and we would thus be justified in assuming that there has been no significant change in the ratio. Comparable ratios using full-time staff only give similar results.

STAFF-INCOME UNIT RATIOS FOR THE EMERGED UNIVERSITIES

	1968-69	1969-70	
	Eight Institutions	Eight Institutions	Ten Institutions*
Full-time Staff	4777.8	5482.4	6582.2
Full-time Equivalent Staff	5312.6	6127.9	7276.6
Income Units	133,028.7	151,847.7	177,863.4
F.T. Staff/Income Unit Ratio	1:27.8	1.27.7	1:27.0
F.T.E. Staff/Income Unit Ratio	1:25.0	1:24.8	1:24.4

* Including Guelph and York.

Table B-2.1

Our preliminary brief expressed the concern that this ratio might have significantly deteriorated. In the cases of some institutions there was a deterioration; others have managed slight improvements. Overall, however, the constancy of the ratio reflects the determination of the university system not to allow deterioration in this important area, despite considerable budgetary stringency.

Table B-2.2 shows the same measures computed for the emerging universities. Comparing the averages for the same group of institutions in the two years, the ratios appear to have increased slightly. This would be expected as they progress towards emergence and conform more closely to the faculty loading patterns of the more mature institutions. It is not surprising that the exclusion of Guelph and York from the emerging group in 1969-70 effected a significant lowering of the ratio for the total group, since these institutions at the time of their emergence had reached average ratios comparable to the emerged universities.

For the entire Ontario system, the full-time equivalent staff to income unit ratio in 1968-69 was 1:23.4 and in 1969-70 is estimated at 1:23.5. Taking full-time staff only, the 1968-69 ratio was 1:26.0 and in 1969-70 is estimated at 1:26.1[1/]

1/ To maintain a full-time staff to income unit ratio of 1:26.1 in 1970-71 will require a net addition of 1,030 full-time staff, approximately the same number as were added in 1969-70. In 1967-68 and 1968-69, about 500 doctorates were granted annually by Ontario universities. Considering that hirings must be considerably in excess of the 1,000 net additional staff, and that not all doctorates are available for university employment, it is evident that Ontario is still a long way from providing for its academic staff needs from its own graduate schools. As the CPUO research effort develops, it is our intention to undertake projections of the supply and demand for university teachers.

STAFF-INCOME UNIT RATIOS FOR THE EMERGING UNIVERSITIES

	1968-69		1969-70
	Eight Institutions*	Six Institutions	Six Institutions
Full-time Staff	1513.9	616.4	759.2
Full-time Equivalent Staff	1661.7	703.1	870.8
Income Units	30,425.6	10,088.8	13,535.7
F.T. Staff/Income Unit Ratio	1:20.1	1:16.4	1:17.8
F.T.E. Staff/Income Unit Ratio	1:18.3	1:14.3	1:15.5

* Including Guelph and York

Table B-2.2

B-3 Exploratory Studies on Quality and Cost

It is clear that there is an increasing concern on the part of the public that it is receiving adequate value for its educational dollar. The recent annual review of the Economic Council of Canada states that "it is vitally important that greater attention be devoted to increasing the efficiency and the productivity of our educational effort".[2/]

Measurement of the quality of educational effort at any level presents a formidable challenge. Nonetheless, it is a challenge which the universities recognize they will have to face, in view of the increasing competition for the taxpayer's dollar. The Committee of Presidents have thus begun to investigate various possible measures of efficiency and productivity in the provincially assisted universities.

Two initial efforts are the analyses of relative costs among Canadian universities and the analysis of research output. Our preliminary findings indicate that the cost/per student of Ontario universities has been on a par with other provinces when student mix, indirect costs of research, and inter-city price indexes are taken into account. (Moreover, Ontario is able to produce more research at this cost per student). Provincial cost per student data contained in DBS #81-212, February 1969 were normalized to bring in the effects of these factors. Unfortunately this most recent issue of DBS #81-212 deals with 1965-66 data. We have no more recent cost per student data in reduced form but a comparison of full-time student/staff ratios for the years 1963-64 through 1968-69 shows a stabilized ratio of about 15.3 for the

2/ Perspective 1975, Sixth Annual Review, September 1969, page 167.

Western Provinces over the past several years and a significant uptrend from 10.0 to 13.1 in Ontario. Application of this change in the Ontario ratio (student/staff ratio can be used as a rough indicator of cost) would serve to further reduce the cost per student in Ontario relative to the Western Provinces. Moreover, it should be pointed out that cost and quality must be considered together if effectiveness is the goal. Using efficiency as the only criterion, student/staff ratios of 30/1, long hours in the classroom and a shortened time period for acquisition of the degree all would create low cost/student and an "efficient" model in purely economic terms. But we want "effective" institutions - not merely efficient ones. We view the rapidity of change in this trend in student/staff ratios with some alarm because in the absence of more precise measures of quality and effectiveness this ratio remains as one of the few indirect measures of the quality of the institution accepted by the academic community.

We have attempted to obtain comparative cost statistics within Ontario for the Colleges of Applied Arts and Technology. The best information on per student cost for 1969-70 in the CAAT's system available to us is a verbal communication:

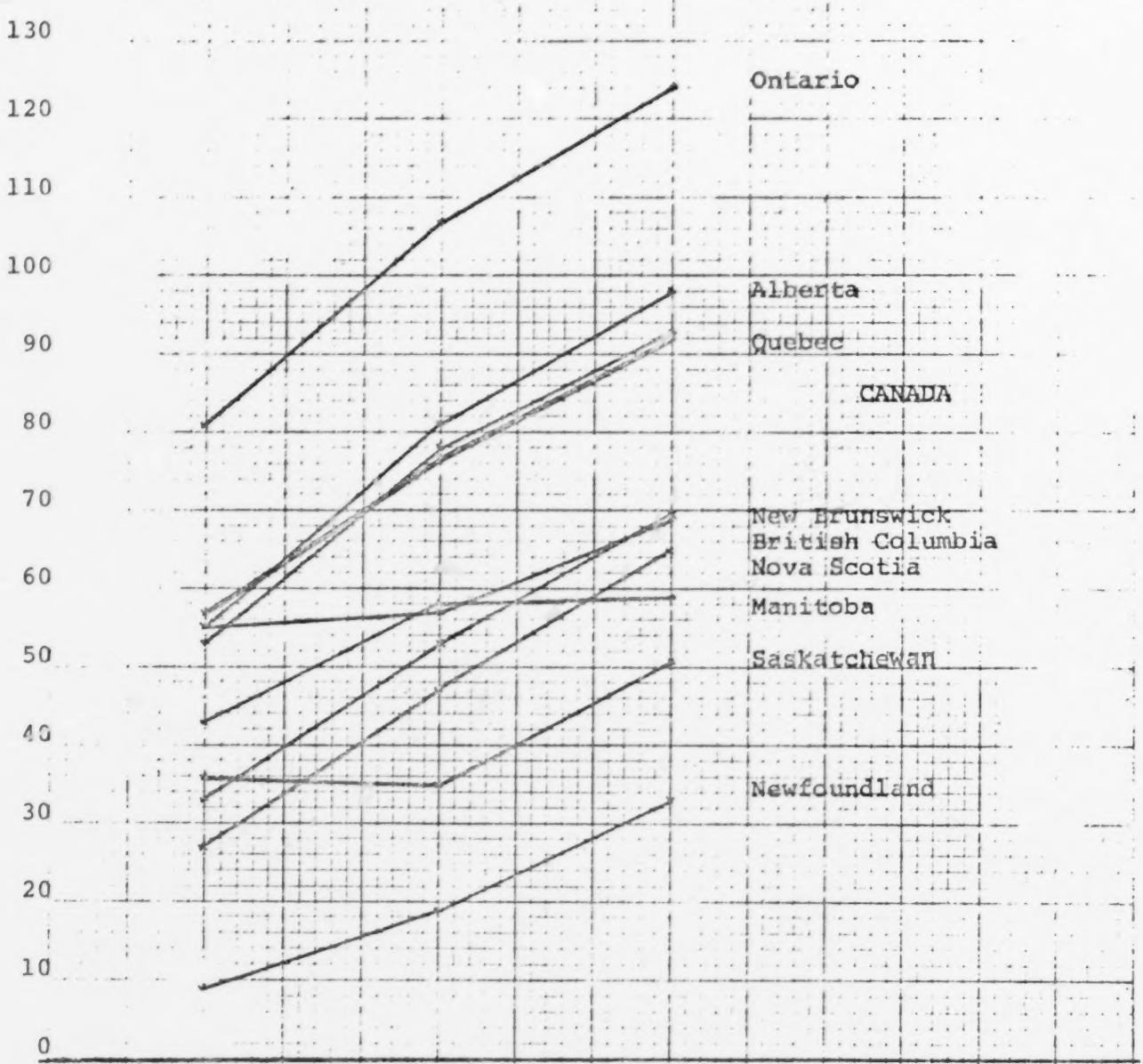
> Per students cost will vary from $1350 to $3150 between the various colleges and the average cost per student for the system is about $1950.[3/]

3/ This is cost per FTE student, as calculated by a CAAT unofficial method. The cost per full-time student would be slightly greater than $1950 per student.

We note here that the cost per student in Ontario for Arts and Science undergraduates is a comparable value, $1836. (Unit value = 1530, average units per FTE student = 1.2, 1836 = 1.2 x 1530). In other words the average cost of a year's education in Arts and Science in the universities is somewhat less than the comparable cost per student in CAAT's. It should also be pointed out that the government contribution for the CAAT student is greater when we consider the differential of student fees of $150 for CAAT's and $480 for universities. We endorse wholeheartedly this level of support for Colleges of Applied Arts and Technology but we wish to point out at the same time that our undergraduate arts and science costs do not appear to be out of line by comparison.

The state of the art of quantitative measurement of the quality of universities is not at a high level; such measures as student/staff ratio, graduate students as a percentage of total enrolment (See Figure B-3.1), library holdings, amount of assisted research funds, etc., are used when comparisons of quality are made. In recent years, North American universities have begun to collect much more information on such things as student contact hours, allocation of academic time and effort to university activities, utilization of space, etc. This will be productive of better measures of cost and effectiveness but it is a slow process. In the meantime students are looking suspiciously at such productivity measures as student contact hours per professor; measures which connote production of students are not in vogue in the student community these days. In summary, we need to do much more in identifying and measuring quality and effectiveness but we must

FIGURE B-3.1



Number of full-time graduate students per 1,000 full-time students, by province.

Source: DBS 81-211

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not be hasty in accepting efficiency in the production of student contact hours as a proxy for effectiveness.

We realize that we must counteract the possible view of the academic as a scholarly recluse who meets class occasionally and dabbles in his research and writing the rest of the time, although how this view could still prevail escapes us. Considering the pressures associated with teaching in the university many of our colleagues would see a return to the sheltered life as utopian. We should not have to emphasize that this view of the academic in the modern university is completely outdated; in fact, he is a very busy man who, among other tasks, prepares for classes, meets classes, counsels students, supervises graduate students, does research, documents this research, writes for publication and serves on committees. The time of a busy man is fairly inelastic and if additional tasks are assigned other tasks suffer in the quality of output or else their completion is delayed. It may have been that several decades ago so-called "platform" time was 12-15 hours and with a couple of hours preparation for each hour of "platform" time a respectable workweek was put in. Now, the average contact with students in a formal class situation averages about 9-10 hours per week. (Student contact hours is a measure of output here but we sound the cautionary note about this measurement again). Preparation for this class time could be anywhere from 15 to 20 hours. Supervision of graduate students which averages over 2 hours per week per graduate student consumes another 4 hours at a rough average of 2 graduate students per professor. The time devoted to research

(which is directly related to graduate student supervision) is much greater than it was; we would estimate this time to average out currently to about 10 hours per week.[4/] Committee time adds more hours. It can be seen that this adds up to a pretty fair work-week.

Some useful measures of productivity related to graduate students and research are graduate students/professor, graduate degrees awarded/professor and publications/professor. We have charted below some trends in these measures. (See Figures B-3.2, B-3.3 and B-3.4).

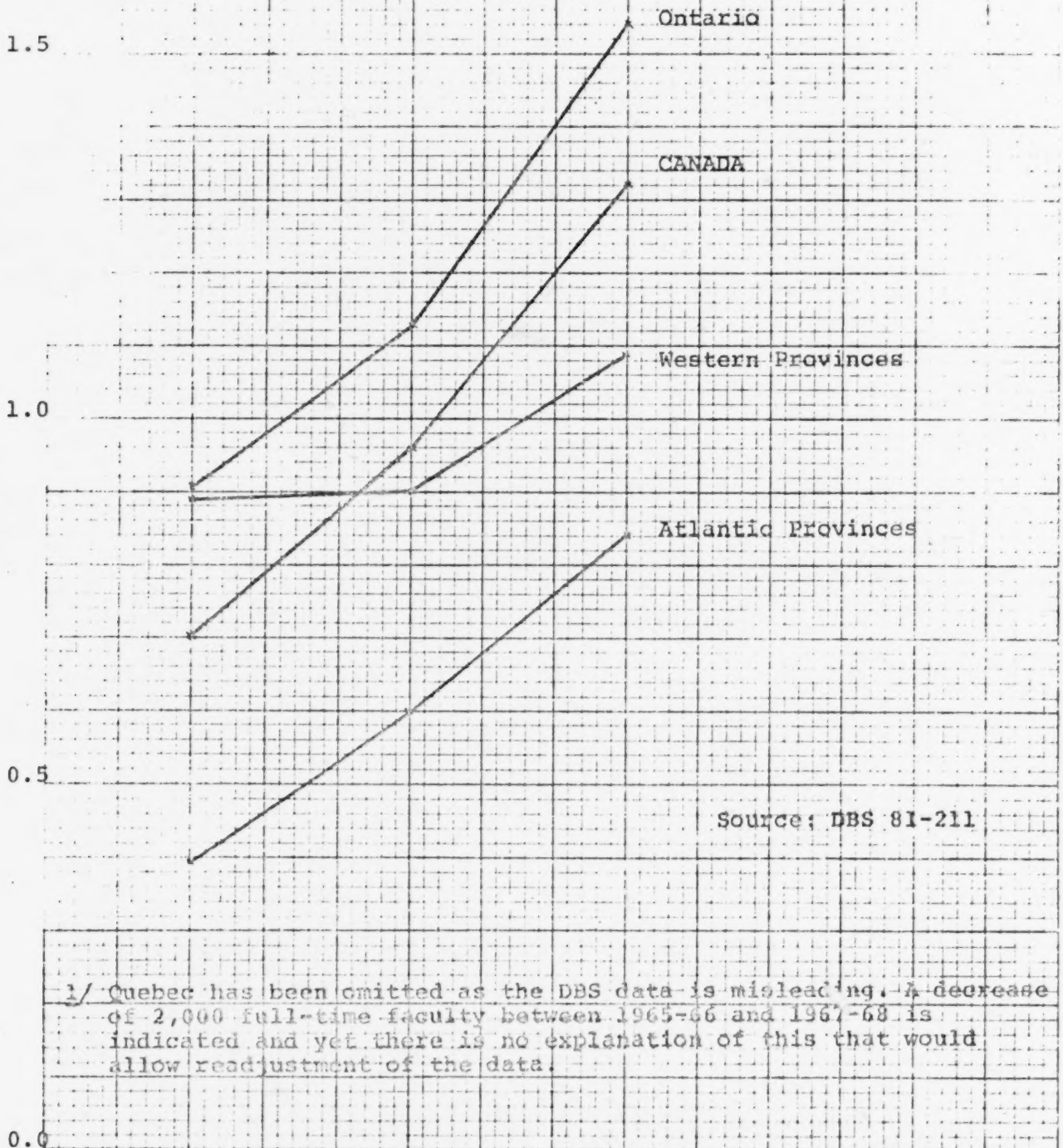
Numbers of full-time graduate students per 1000 students have gone from 80 to 124 in Ontario during the period 1961-62 through 67-68. The same trend is evident in graduate students per faculty member - now over 1.5 in Ontario. Number of graduate degrees awarded per faculty member in Ontario has gone from 0.31 to 0.51 in this same span of time. And publications per staff member taken from the University of Toronto Presidents Reports show a pronounced upward trend increasing 2 to 3 times over a span of 40 years.

In summary then, our preliminary data show pronounced up-trends in the rough measures we now have which might be considered quality-related and productivity-related by present criteria. And this is being accomplished without startling increases in cost per student.

4/ Report on a Study of Faculty Activities at the University of Toronto, Hansen, B. L. and Sandler, S., Office of Institutional Research, University of Toronto, 1967.

FIGURE B-3.2

No. of full-time graduate students per full-time faculty member[1/]



Source: DBS 81-211

1/ Quebec has been omitted as the DBS data is misleading. A decrease of 2,000 full-time faculty between 1965-66 and 1967-68 is indicated and yet there is no explanation of this that would allow readjustment of the data.

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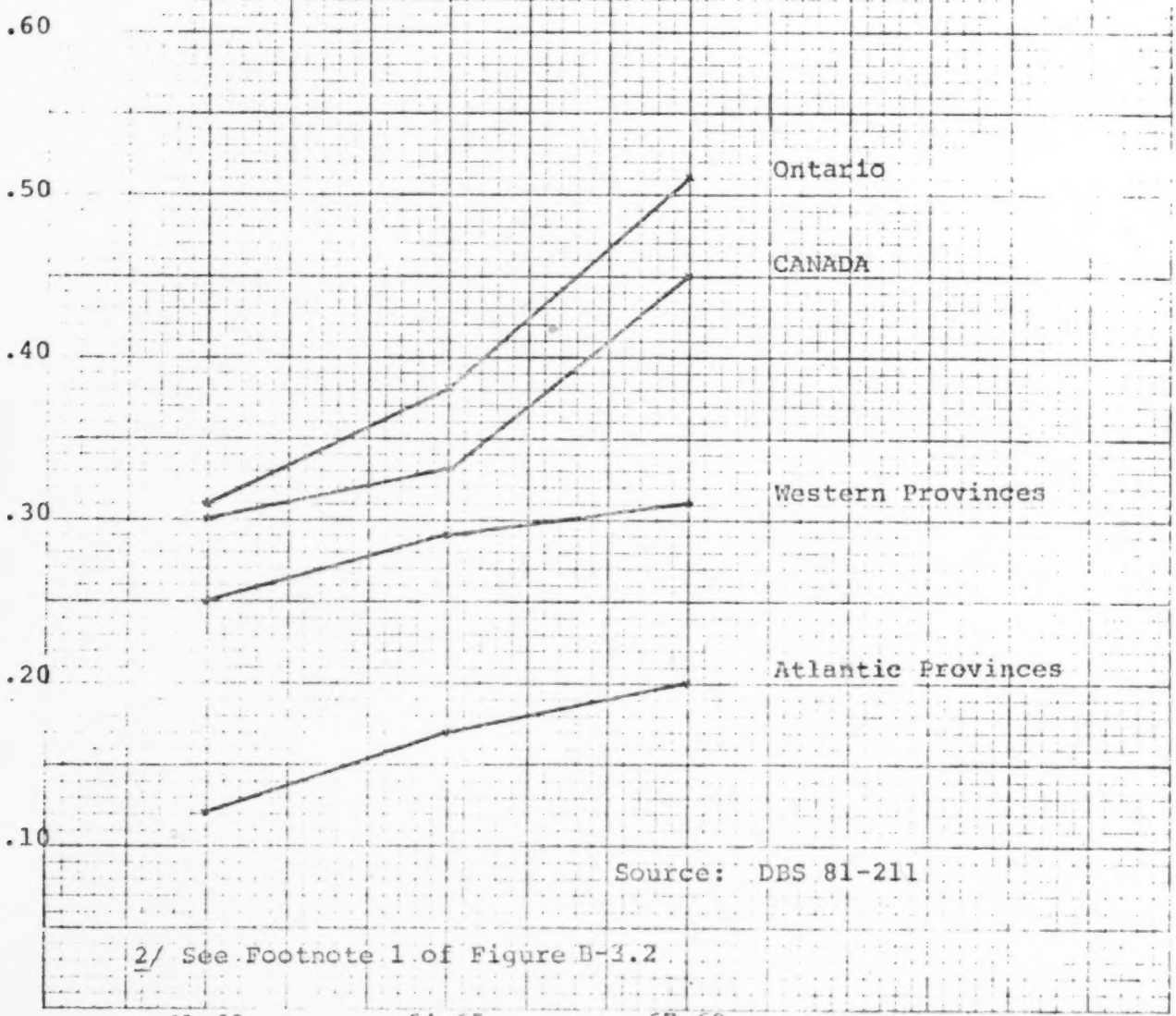
FIGURE B-3.3

Number of graduate degrees/full-time faculty member.[2/]

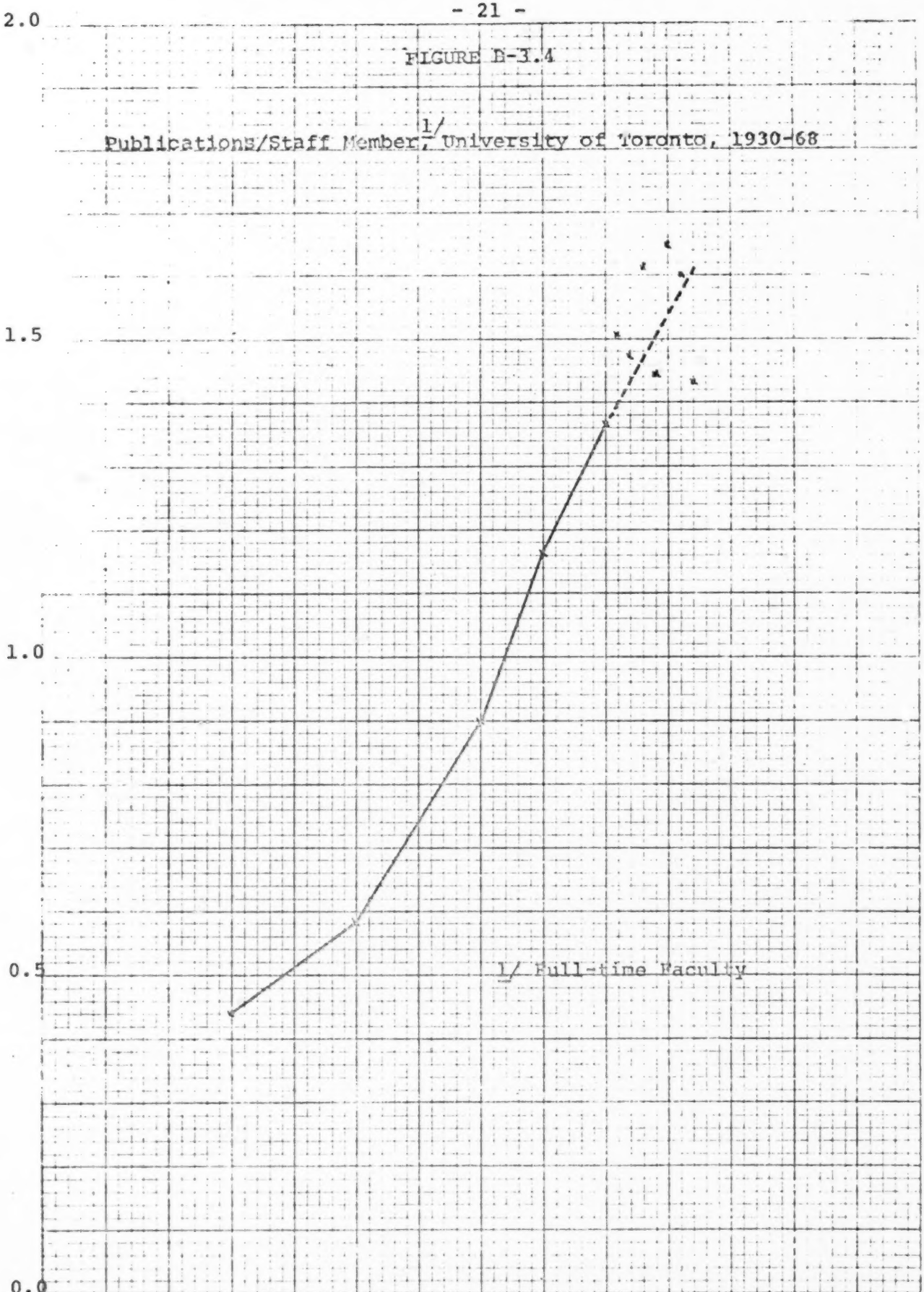


Source: DBS 81-211

2/ See Footnote 1 of Figure B-3.2

FIGURE B-3.4

Publications/Staff Member, 1/ University of Toronto, 1930-68



1/ Full-time Faculty

Source: Presidents Reports, University of Toronto, 1930-68

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C. PROJECTIONS OF ENROLMENT WITH FINANCIAL IMPLICATIONS FOR 1970-71

C-1 Historical Resumé

Table C-1.1 is a revision of the historical enrolment and financial data shown in the preliminary brief as Table 1 of Appendix A, replacing various figures with more accurate ones now available. Enrolment increases accounting for 4,000 units over projections (2.1%) have raised our estimate of basic operating income for 1969-70 to $294 million and total grants to $259 million. These figures make the decreasing contribution of increase in unit value even more marked than indicated in the earlier report. In 1968-69, 37% of the increase in basic operating income was due to increase in unit value, while in 1969-70 this percentage has been reduced to 27%.

Grants per student and grants per unit have been added to Table C-1.1 to provide summary measures of the impact of government granting policy on the level of university operations. Unit value alone does not provide an accurate picture of the level of support, in view of the changing levels of special grants, revised methods of counting students, alterations in weights, etc.

What appears to be a 5.5% increase in unit value in 1969-70 is in fact something less if we take into account the movement of special grants (particularly for Medicine) into formula income in 1969-70. Taking into account income from formula, fees, and special grants, the total available financial support per unit increased by only 2.4% in 1969-70 over 1968-69. Correspondingly, as shown

TABLE C-1.1

ANALYSIS OF INCREASES TO OPERATING INCOME IN PROVINCIALLY ASSISTED UNIVERSITIES OF ONTARIO, 1967-68 THROUGH 1969-70

		1967-68 ACTUAL	1968-69 ACTUAL	1969-70 ESTIMATED ACTUAL
ENROLMENT				
Students (FTE)[+]		80,489[#]	97,086	112,000
Increase	- No.		16,597	14,914
	- %		20.6%	15.4%
Basic Income Units		137,533	163,901	192,000
	- No.		26,368	28,099
	- %		19.2%	17.1%
Units per Student		1.71	1.69	1.72
FINANCIAL IMPLICATIONS				
Unit Value Increase	- %		9.8%	5.5%
	- $		$ 130	$ 80
Unit Value	- $	$1320	$1450	$1530
Basic Operating Income	- $	$182m	$238m	$294m
Increase	- $		$ 56m	$ 56m
From Increased Units			$ 35m	$ 41m
From Increased Unit Value			$ 21m	$ 15m
Increase	- %		30.8%	23.5%
Standard Fees*	- $	$ 38m	$ 46m	$ 54m
Increase	- $		$ 8m	$ 8m
	- %		21.0%	17.4%
Formula Grants	- $	$144m	$192m	$240m
Increase	- $		$ 48m	$ 48m
	- %		33.3%	25.0%
Special Grants	- $	$ 18m	$ 23m	$ 19m
Increase	- $		$ 5m	-$ 4m
	- %		27.8%	-17.4%
Total Grants	- $	$162m	$215m	$259m
Increase	- $		$ 53m	$ 44m
	- %		32.7%	20.5%
Grants per Student	- $	$2013	$2215	$2313
Increase	- $		$ 202	$ 98
	- %		10.0%	4.4%
Grants per Unit	- $	$1178	$1312	$1349
Increase	- $		$ 134	$ 37
	- %		11.4%	2.8%

[+]The figures for FTE students are a result of adding full-time equivalents of part-time students to full-time enrolments. For instance, in 1968-69 there were approximately 84,000 full-time students and 57,000 part-time students converting to 13,000 full-time equivalents, for an FTE total of 97,000. The historical statistics and projections shown here will not correspond with those contained in Ontario University and College Enrolment Projections to 1981-82 (1968 Projection), Cicely Watson and Saeed Quazi, Ontario Institute for Studies in Education, Enrolment Projections 4, 1969. The latter include full-time students only, and incorporate students in theological colleges and other non-provincially assisted institutions.

[#]Does not include 556 students at Osgoode Hall Law School who were funded through special grants.

*Fees per student assumed at $470 for 1967-68, $483 for 1968-69, and

by the last two sections of the table, grants per unit (that is, per weighted student) increased by 11.4% in 1968-69 and by only 2.8% in 1969-70. (The comparable data for grants per unweighted student are 10.0% and 4.4% respectively).

Considering increases in salary levels and the effects of inflation on other university expenses, these figures point out most clearly the extent to which the universities were squeezed in 1969-70. In real terms, there was a reduction in the level of support per weighted student. We don't find this a happy result.

C-2 Projections for 1970-71

In the preliminary brief we forecast an enrolment of 126,000 students contributing 217,000 units. We now have projections from the universities available, and these sum to 123,000 students contributing 216,000 units. Since the 1969-70 enrolments appear to be about 2,000 students (or 2.1%) over projections, and we believe that there is still a bias towards underestimation present in the system, we have retained our original figure of 126,000 students. We noted, however, an increase in the university projections in the ratio of income units to students, from 1.72 to 1.75. Examination of trends in this ratio by university leads us to believe that an increase to at least 1.74 is likely, and we have therefore increased our estimate of units to 219,000 (126,000 students x 1.74 units/student).

Figure C-2.1 shows plots of FTE students and income units based on data from 1967-68 to 1969-70 and our projections for 1970-71. In the absence of artificial restraints on enrolment increase, one would expect total enrolments to follow a typical exponential growth curve. A semi-logarithmic scale has been used, since this would convert an exponential function to a straight line, which would facilitate projection. The curve is remarkably close to a straight line, but with a slight downward turn, indicating that growth is slightly less than exponential.

In the preliminary brief we utilized a factor of approximately $\pm$5% to generate minimum and maximum estimates. Since the error in estimation for 1969-70 was considerably reduced from the preceding year, we have reduced the margin of our estimates to approximately $\pm$3%. The result of these various changes is shown in Table C-2.1. As with Table C-1.1, sections on grants per student and grants per unit have also been added.

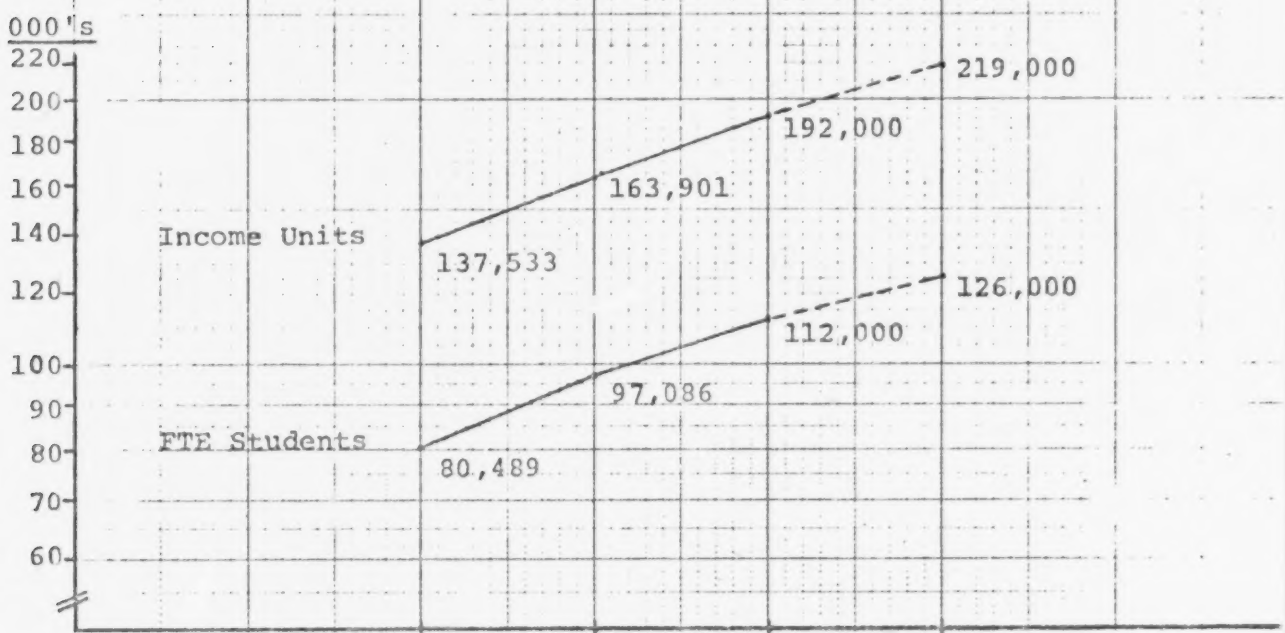
For each level of forecast enrolment the impact of total grants of no increase, and increases of 5%, 10% and 15% are illustrated. The value of the BIU with no increase is shown as a baseline, which indicates that at the most likely level of enrolment increased enrolment alone would account for a 14% increase in total grants required, with a 10% increase being required at a minimum level and a 17% increase at a maximum level.

The additional sections on grants per student and grants per unit in Table C-2.1 will facilitate examination of alternative values of the income unit in terms of their effects on the real level of support per student or per weighted student.

FIGURE C-2.1

Full-Time Equivalent Students

and Income Units, 1967-68 to 1970-71*



* Values are actuals for 1967-68 and 1968-69, estimated actuals for 1969-70, and CPUO projections for 1970-71.

TABLE C-2.1

PROJECTIONS OF OPERATING GRANTS TO PROVINCIALLY ASSISTED UNIVERSITIES OF ONTARIO FOR 1970-71

	1969-70 Projection	Forecasts of Enrolment for 1970-71											
		Minimum				Most Likely				Maximum			
Students (FTE)	112,000	122,000				126,000				130,000			
Increase - No.		10,000				14,000				18,000			
- %		8.9%				12.5%				16.1%			
Basic Income Units*	192,000	212,000				219,000				226,000			
Increase - No.		20,000				27,000				34,000			
- %		10.4%				14.1%				17.7%			
	1969-70 Projection	Financial Implications of Alternative Increases in Unit Value for 1970-71											
Unit Value Increase - %		0%	5%	10%	15%	0%	5%	10%	15%	0%	5%	10%	15%
- $		0	78	156	234	0	78	156	234	0	78	156	234
Unit Value[@] - $	$1557	$1557	$1635	$1713	$1791	$1557	$1635	$1713	$1791	$1557	$1635	$1713	$1791
Basic Operating Income	$299m	$330m	$347m	$363m	$380m	$341m	$358m	$375m	$392m	$352m	$370m	$387m	$405m
Increase - $		31m	48m	64m	81m	42m	59m	76m	93m	53m	71m	88m	106m
From Increased Units		31m	31m	31m	31m	42m	42m	42m	42m	53m	53m	53m	53m
From Increased Unit Value		0m	17m	33m	50m	0m	17m	34m	51m	0m	18m	35m	53m
Increase - %		10.4%	16.1%	21.4%	27.1%	14.0%	19.7%	25.4%	31.1%	17.7%	23.7%	29.4%	35.5%
Formula Grants[#]	$245m	$271m	$288m	$304m	$321m	$281m	$298m	$315m	$332m	$290m	$308m	$325m	$343m
Increase - $		26m	43m	59m	76m	36m	53m	70m	87m	45m	63m	80m	98m
- %		10.6%	17.6%	24.1%	31.0%	14.7%	21.6%	28.6%	35.5%	18.4%	25.7%	32.7%	40.0%
Total Grants[+]	$259m	$285m	$302m	$318m	$335m	$295m	$312m	$329m	$346m	$304m	$322m	$339m	$357m
Increase - $		26m	43m	59m	76m	36m	53m	70m	87m	45m	63m	80m	98m
- %		10.0%	16.6%	22.8%	29.3%	13.9%	20.5%	27.0%	33.6%	17.4%	24.3%	30.9%	37.8%
Grants/Student	$2313	$2336	$2475	$2607	$2746	$2341	$2476	$2611	$2746	$2338	$2477	$2608	$2746
Increase - $		23	162	294	433	28	163	298	433	25	164	295	433
- %		1.0%	7.0%	12.7%	18.7%	1.2%	7.0%	12.9%	18.7%	1.1%	7.1%	12.8%	18.7%
Grants/Unit	$1349	$1344	$1425	$1500	$1580	$1347	$1425	$1502	$1580	$1345	$1425	$1500	$1580
Increase - $		- 5	76	151	231	- 2	76	153	231	- 4	76	151	231
- %		-0.4%	5.6%	11.2%	17.1%	-0.1%	5.6%	11.3%	17.1%	-0.3%	5.6%	11.2%	17.1%

*Assuming an income unit per student ratio of 1.74

[@]The base value for 1969-70 includes the $27 per unit redistributed computer grant.

[#]Basic operating income less standard fees, assumed at $480 per student.

[+]Formula grants plus special grants estimated at $14m.

D. PROBLEMS RELATED TO THE BUDGET CYCLE, ENROLMENT FORECASTING AND INCOME DETERMINATION

We would like to indicate here our feelings about the necessity for dealing with these problems soon. The difficulties of forecasting enrolment and determining income for both operating and capital purposes are all tied in with the present budget cycle.

In the original draft of the document describing the operating grants formula the desirability of early announcement of the value of the basic unit was recognized. The value of the income unit is, in fact, not announced until late February or early March and by this time much of the budgetary planning must have been done for the coming fiscal year. For example, "hunting licences" must have been issued for new staff prior to Christmas in order to obtain the best quality new staff and to give them adequate lead time for assuming their new positions.

During the period from December through February between the meetings of CPUO with CUA and the tabling of provincial estimates there is a virtual hiatus in which little can be done with the university target budget except experiment with various possible increases to the unit value. After the unit value is announced there is still the problem of estimating enrolment. Most universities estimate this enrolment conservatively because enrolment determines their budgets. These "pessimistic" estimates cause conservative budgets to be formed which, after actual enrolments are determined, open up the universities to questions from

government about overruns and from staff about degrading staff/ student ratios. Thus, what is a perfectly natural process of conservative budgeting can be construed by these parties to be not desirable in the present circumstances. On the other hand, fiduciary personnel would view this as desirable since it is much easier to distribute more money than it is to call it back from departments. In any case the forecasting of enrolment has been about as good as could be expected considering the dynamic nature of higher education in Ontario in recent years; the net errors of the ratios of actual to estimate enrolment were 1.06 in 1968-69 and 1.02 in 1969-70.

Another undesirable characteristic of the formula which is of great cause for concern is the necessity to grow in numbers of students or in average weight per student if essential minimum increases to operating income are to be ensured. This is a very strong argument for rises in basic income unit value which are not less than inflationary increases in costs. There is at least one university which should consider relative stabilization of enrolment. It is not necessary to dwell on the reasons for not encouraging indiscriminate increases in average weights.

For the reasons cited above we believe that serious study in the coming year should be given to the ways in which a biennial operating grant system could be introduced which would be designed to (1) insure minimum increases to the system and to the universities, (2)promote better enrolment and financial planning in the universities, (3) control overruns so that Government would

know its maximum possible obligation well in advance, and (4) control underruns so that universities would know their minimum expectations well in advance. CPUO would be happy to cooperate with CUA in such a study.

E PROJECTED INCREASES IN COST COMPONENTS IN 1970-71

In attempting to project cost increases in various components of university costs, we are still faced with insufficient data. In fact, the discontinuation of the UA-4 form and its replacement by financial reporting in the CAUBO/DBS format has resulted in a reduction in detail of cost breakdowns in some areas important for our purposes. Salaries of library staff, administration, staff, and physical plant staff are no longer shown separately. This is a major handicap, because patterns of cost change are substantially different in salary and non-salary areas. Rather than use 1968-69 data, as was the case in our earlier brief, we have estimated breakdowns of the 1969-70 data on the basis of 1968-69. This approach is makeshift at best, and would lead to greater inacuracies if carried into the future.

Development of the operating expense section of the proposed CPUO data bank is of the highest priority for the immediate future. In the next several months the CPUO research division will be working actively with the university business officers and DUA officials in attempting to devise a mutually acceptable reporting format which will provide the facility for improved cost analysis.

Expenses have been broken out in this section under the following headings:

Academic salaries

Fringe benefits - academic

Non-academic Salaries

Academic Support and Administration

Library Professional

Library Other

Physical Plant

Student Services

Library Books and Periodicals

Other Non-Salary Expenses

With the exception of student services, which is a new category available in the CAUBO/DBS forms, and a slightly different treatment of fringe benefits, these categories are the same as in our preliminary brief.

Under certain of the cost headings, we have no further data. In these cases, we have not repeated the arguments of the earlier brief, but simply stated the basis of our estimate and its value.

a) Academic Salaries

Our briefs in previous years have included extensive comparisons of Ontario academic salaries with academic salaries in other jurisdictions and salaries in other professions deemed comparable. While such comparisons are clearly important in assessing salary changes from year to year, they are always subject to difficulties in interpretation and open to the accusation of selective bias (that another set of comparisons might lead to different conclusions). It is for this reason that the Committee of Presidents has agreed to cooperate with CUA and OCUFA in undertaking an independent review of academic salaries in

Ontario. We thus have not presented in this brief any comparisons with other jurisdictions and professions, since the independent salary review is expected to undertake such comparisons in a much more thorough fashion than our resources at present would permit.

It is necessary, however, to settle upon some basis of determining salary levels for 1970-71, and to this end we have consulted extensively with OCUFA. We consider these consultations to have been most valuable in identifying several sets of factors which are relevant to salary policy, and in reaching a measure of agreement on the interpretation and application of some of these factors.

Appendix E-1 sets out the analysis on which we have based our calculations of increases to academic salaries for 1970-71. Part A identifies a set of "formula factors" which are considered to be always relevant to the adjustment of salary levels from year to year. On the basis of available data, values are attached to each of these factors for 1970-71. Part B explores certain problems of philosophy, definition, and methodology which could affect the values derived in Part A.

The values derived in Part A are conservative. For instance, the value adopted for cost of living compensation, 4.4%, is lower than the most recent trends would indicate.

Essentially, Part A calculates on the basis of hard data a minimum amount necessary to simply maintain the present salary structure into another year. There is evidence, however, of serious and growing problems in the current salary structure. There are strong pressures at the lower end of the salary profile, both in

the market pressures affecting the hiring of new Ph.D.'s, and in the many cases of real personal hardship experienced by junior members of faculty. There are increasing morale problems in the middle-aged group related to the flattening out of the earnings curve. We also recognize a need to provide for greater incentives for the truly outstanding scholar.

It is difficult to quantify these problems or their solutions. In the present financial climate, we do not expect to be able to make adjustments sufficient to rectify these problems in the forthcoming year. Nonetheless, there are real problems in the salary structure; it is imperative that we begin to tackle them. For the current year, we would wish to add a modest 2% to the figures derived in Part A, for selective increases which would enable us to make a start at remedying existing inequities. The application of this additional amount would differ for various institutions, with their differing problems. All, however, require the additional flexibility which this 2% would provide.

Part B of Appendix E-1 discusses some of the alternative ways of calculating adjustments for inflation. The Presidents do not accept the principle of after-tax compensation for inflation. However, recent upward trends in the cost of living justify using a figure higher than 4.4% shown in Part A and it appears that a value of 4.9% for this component is reasonable.

The factors in Part A accumulate to 10.2%. An additional 0.5% for recent upward trends in increases in the cost of living yields 10.8% total increment to continuing staff which could be provided

by an 8.8% increase in salary budget.[1/] Addition of another 2.6% for improving the salaries of beginning and senior faculty and to finance progress through the ranks has led us to use the figure of 11.4% for calculation of cost increases in academic salaries.

b) Fringe Benefits - Academic

The new method of financial reporting this year separates out fringe benefits of the academic staff only. In the absence of any external indicators of likely cost increases in this sector, we have adopted the value used for academic staff increases, that is 11.4%

c) Non-Academic Salaries

As we stated in our preliminary brief, continuing strong pressures for salary increases in these areas would indicate that provisions of 8% for academic support and administration and 10% for physical plant would seem to be reasonable indicators of necessary minimum increases. It should be noted also that the recent upsurge in union activity amongst non-academic staff will magnify these pressures, and our suggested minimum figures are likely conservative. The disruptive strike experienced in recent weeks by one of our institutions should be regarded as a bellweather of the mood which is developing amongst non-academic staff on many of our campuses.

1/ It should be pointed out that a portion of this recommended increase is a requirement of the current state of a growing system with a concentration of staff in the younger age groups, where the rate of salary progress is more rapid than is now the case in the more senior age groups. The difference between the 2.6% value for basic career progress (Factor A-3) and the reduction of 2.0% for the self-financing aspect out of flow effects, represents the magnitude of this requirement, 0.6%. Translated into dollars at a 1969-70 estimated average salary of $15,000, for 7,300 full-time staff, this amounts to approximately $650,000 for extra costs occasioned by the rapid growth of the Ontario university system in recent years. The 10.8% total increment to continuing staff results from inflating gain in national income (3%) and provision for career progress (2.6%)by 4.9% rather than 4.4%.
Thus, 104.9%(100+3.0+2.6)-100 = 10.8%.

We note again, as in the October brief, the recent settlements with construction trades amounting to an average of 33% annually.

For library professional staff we have again adopted the value for academic staff, calculated in the present brief as 11.4%. "Library other" staff have been assigned the value for academic support and administration staff,that is, 8%.

d) Student Services

This new category includes both salary and non-salary costs of such functions as athletics, student health and counselling services, awards offices, etc. Since the majority of costs in this sector are likely to be for salaries, we have set a value of 8% in the absence of specific information on cost increases.

e) Library Books and Periodicals and Other Non-Salary Expense

We have no further information which would lead us to revise the values set in the earlier brief, 10% for library books and periodicals, and 5% for other non-salary expenses.

f) Summary of Component Expenses

In the section above which discusses the breakout of operating expense in 1969-70 budgets, concern was expressed over certain shifts, particularly the reductions in percentages to library books and "non-academic" expenses. Although we do not view the 1969-70 distribution as ideal, in the absence of any empirical basis to derive an ideal distribution, we will employ the 1969-70 distribution as a basis for weighting the components.

Table E-1 summarizes the estimated increases to component expenses. The total estimated increase is 9.13%.

TABLE E-1

PROJECTED INCREASES IN COST COMPONENTS IN 1970-71

		% of Budget*	% Increase	Weighted % Increase
Academic Salaries		46.0		
Salaries	41.8		11.4	4.77
Fringe Benefits	4.2		11.4	0.47
Non-Academic Salaries		27.1		
Academic Support & Admin.	16.3		8.0	1.30
Library Professional	1.6		11.4	0.18
Library Other	2.8		8.0	0.22
Physical Plant	6.3		10.0	0.63
Student Services		1.7	8.0	0.14
Library Books & Periodicals		3.0	10.0	0.30
Other Non-Salary Expense		22.3	5.0	1.12
TOTAL		100.0		9.13

*Based on UA-4 and UA-1 budgeted data for 1969-70 for the ten emerged universities; salary percentages for administration and physical plant staff have been estimated on the basis of the 1968-69 proportion of administration and physical plant budgets.

F. CONCLUSIONS

At the projected level of enrolment, increased units alone are expected to generate a requirement for an additional $42 million in basic operating income for 1970-71.[1/] To meet increased costs at 9.13%[2/], a minimum of an additional $31 million[3/] will be required, for a total increase in basic operating income of $73 million. When the projected fee income and special grants are taken into account, total grants of $326 million are required, an increase of 25.9%. Grants per unit at this level would be $1489, as compared with $1349 in 1968-69, an increase of 10.4%. In view of the increase in grants per unit which did not meet inflationary cost increases in the current year, we do not consider this percentage increase in total grants per unit to be unreasonable.

1/ From Table C-2.1

2/ It should be noted that this increase must be calculated on a base of $1557 for 1969-70, which includes $27 per unit originally allocated as special grants for computing purposes.

3/ 219,000 units x 9.13% of $1557.

APPENDIX E-1

FACTORS TO BE CONSIDERED IN RECOMMENDATIONS FOR ACADEMIC SALARY INCREASES IN THE CPUO BRIEF TO CUA ON 1970-71 OPERATING GRANTS

This working paper concentrates on identifying and carefully defining analytical factors which are relevant to the determination of adjustments to salaries from year to year. Considerations of social philosophy, economic analysis, and measurement methodology have all played an important part in the development of the approach set out below.

The various factors identified fall into two groups. The first group of factors, discussed in Part A, are those which can be quantified in a formula approach. These factors would be relevant in any given year, and once general agreement were reached on definition, methodology, and sources of data, calculation of formula values could be performed routinely by a set of procedures constant from year to year. Compensation for increased cost of living, share of increasing national wealth, and provision for basic career progress fall into this first group. There are difficulties in interpretation of these formula factors and these difficulties are discussed in Part B.

There is a second group of factors, which is not amenable to the formula approach and which would not necessarily be relevant every year. Adjustment of the career earnings curve and of relative position vis a vis other professions fall into the second group. These factors cannot be quantified at this time and are the subject of further study. We have included some qualitative comments on these factors in Part B, however.

PART A - FACTORS CALCULATED BY FORMULA

In the case of each factor in Group A we have established its meaning, argued its applicability, proposed a relevant measure, and suggested a minimum value for 1970-71.

FACTOR A-1

Compensation for Increased Cost of Living

The meaning of this factor may seem self-evident, but it is important to point out that it must not be considered a salary increment in the real sense. Such compensation is merely a device for providing the same salary in real terms.

Cost of living in Canada has been rising rapidly, particularly in the last six months, and there is as yet no indication of a significant downturn, despite governmental efforts to contain inflation. These efforts may or may not be successful, and rather than try to predict the level of compensation which will be required in 1970-71, we have adopted the principle of delayed compensation, i.e. that the wage-earner should be compensated for the loss of purchasing power which he suffered in a preceding period. The best indicator would seem to be the most recent twelve-month period for which data are available, ending in October 1969. For this period the mean increase over the corresponding months for the previous year was 4.4%.

There is the vexing question of whether an individual should receive cost of living compensation on his gross salary or after an allowance for the effects of personal income tax. The argument

against the after-tax calculation is that this would frustrate the intent of the progressive tax system, that an individual should pay proportionately more when he is earning more. The argument in favour of an after-tax calculation is based on real personal consequences - that unless cost of living compensation is sufficient to cover the effects of income tax, the individual is required to live on a reduced income. Considering the unadjusted increase only, the most recent data over a twelve-month period suggest a value for this component of 4.4%.

FACTOR A-2

Share of Increasing National Wealth

In a dynamic economy, there is a sufficient rate of growth in national productivity to exceed the rates of inflation and population increase and thus ensure a real increase in per capita national wealth. Canada has such an economy; over the period 1961-68 real gross national product per capita increased by an average of 3.9% annually. The future prospects are also optimistic. The Economic Council states that Canada will "continue to remain, at least into the 1980's, in a situation that is particularly favourable for strong growth in real per capita income and in average real family income."1/

Social justice requires that such an increase in national wealth be distributed to its citizens. It is therefore reasonable to assume that average incomes in real terms will rise at a

1/ Perspective 1975, Sixth Annual Review, Sept. 1969, pp. 144-145

percentage which reflects the rate of national economic advance. The many recognized ways in which knowledge contributes to national productivity and the central role of the academic in generating and disseminating such knowledge would seem to justify the entitlement of the academic to at least an average share in the result of improvements.

Projections of GNP are unreliable, and rather than anticipate uncertain future performance, it would seem prudent to distribute a share of the increase only after the real performance of the economy is known. We would therefore derive a value for 1970-71 from the latest available hard data for the calendar year 1968. In that year, per capita GNP in Canada rose by 3.0%.2/

FACTOR A-3

Provision for Basic Career Progress

A person beginning his career has an expectation that his salary will rise over the years through annual increments and promotion through the rank structure, as a result of his increasing experience and competence, and therefore greater usefulness to the employing organization. This expectation exists apart from the national economic trends identified in the first two factors, that is, changes in cost of living and national wealth. If one assumes a static economy (where the preceding factors would not apply), and a constant number of employees, average salary would not change

2/ Calculations based upon data on GNP and population contained in the Canadian Statistical Review, Dominion Bureau of Statistics, 1969.

from year to year. Nevertheless, there still could be annual increments to continuing staff, provided for by career life cycle flows i.e. employees retiring have higher salaries than employees replacing them.

In order to establish a value for necessary increments to provide for basic career progress, the age-earnings profile in Ontario universities for 1968-69 was analyzed.[3/] This profile, presented in Figure 1, reveals that the average individual moving up the curve would progress to roughly 2.25 times his starting salary after 35 years. (There is, of course, considerable variability, particularly at the top end of the curve, but our purposes require only an average.) The shape of this curve is crucial to our calculations, as the superimposed hypothetical compound interest curve illustrates. This compound interest curve represents the theoretical progress of an individual proceeding to 2.5 times his original salary after 35 years; the compounded annual increase would be 2.65%. However, salary progress does not take place at a uniform rate; it is greatest in the earlier years and then tails off. The relevance of this finding for the Ontario university system at this point in time is in the distribution of academic staff by age

3/ In the absence of actual career history data, the use of a cross-sectional age curve has both advantages and disadvantages. It has the advantage of eliminating the effects of Factors A-1 and A-2. The disadvantage lies in the validity of this representation as it pertains to the future. It could be argued that the curve should be adjusted to a steeper slope than has existed in the past, i.e. that career incentives should be greater. Calculations in Part B show the present costs of some possible adjustments.

(shown in Table 1). A system with a high concentration of faculty in the younger age groups has a heavy commitment to provide increments for those individuals who are moving up the steepest portion of the career earnings curve.

Table 1 sets out our calculations of the current effects of this phenomenon, by assuming the differences in median salaries between age groups in 1968-69 represent annual increments. A weighting of these increments by the numbers in each age group produces a mean annual increment of 2.6%. These two analyses (actual curve and compound interest curve) arriving at roughly the same values would tend to support an annual increase of 2.6% for basic career progress.

Accumulation of Part A Factors

The calculations set out below are based on the minimum derived for each factor in 1970-71, which are as follows:

A-1	Compensation for increased cost of living	4.4%
A-2	Share of increasing national wealth	3.0%
A-3	Provision for basic career progress	2.6%

In accumulating these factors, the inflationary adjustment should be multiplicative, so that the other two factors are not applied in deflated dollars. The equation for determining the cumulative effects of these factors is thus:

Part A Factors Increase =

$$(100 + A\text{-}1)\%\,(100 + A\text{-}2 + A\text{-}3) - 100 =$$

$$104.4\%\,(100 + 3.0 + 2.6) - 100 = 10.2\%$$

With respect to the determination of a salary budget, the career progress factor is in part self-financing, because of the flow effects referred to above. The magnitude of these flow effects, however, will differ from institution to institution and from year to year. In particular, flow effects will be different in rapidly growing institutions than in those which are in relative equilibrium. A model for expressing these flow effects is included as Addendum 1.

In calculations of the salary component of the BIU, therefore, a reduction to the provision for career progress should be made for the extent to which this is self-financing. We have surveyed the Universities and found that in 1969-70,[4/] increases of 10.2% to continuing staff produced an increase of 8.3% in average salary of all staff. Thus an 8.3% increase in salary budget will allow an average increase of 10.2% to continuing staff.

4/ Data for 1969-70 were available for all institutions but one; for this institution the average of percentages for 1967-68 and 1968-69 was used.

FIGURE 1

COMPARISON OF INDIVIDUAL'S INCREASING SALARY
AT 2.65% OVER 35 YEARS WITH 1968-69 PATTERN AT 2.6%

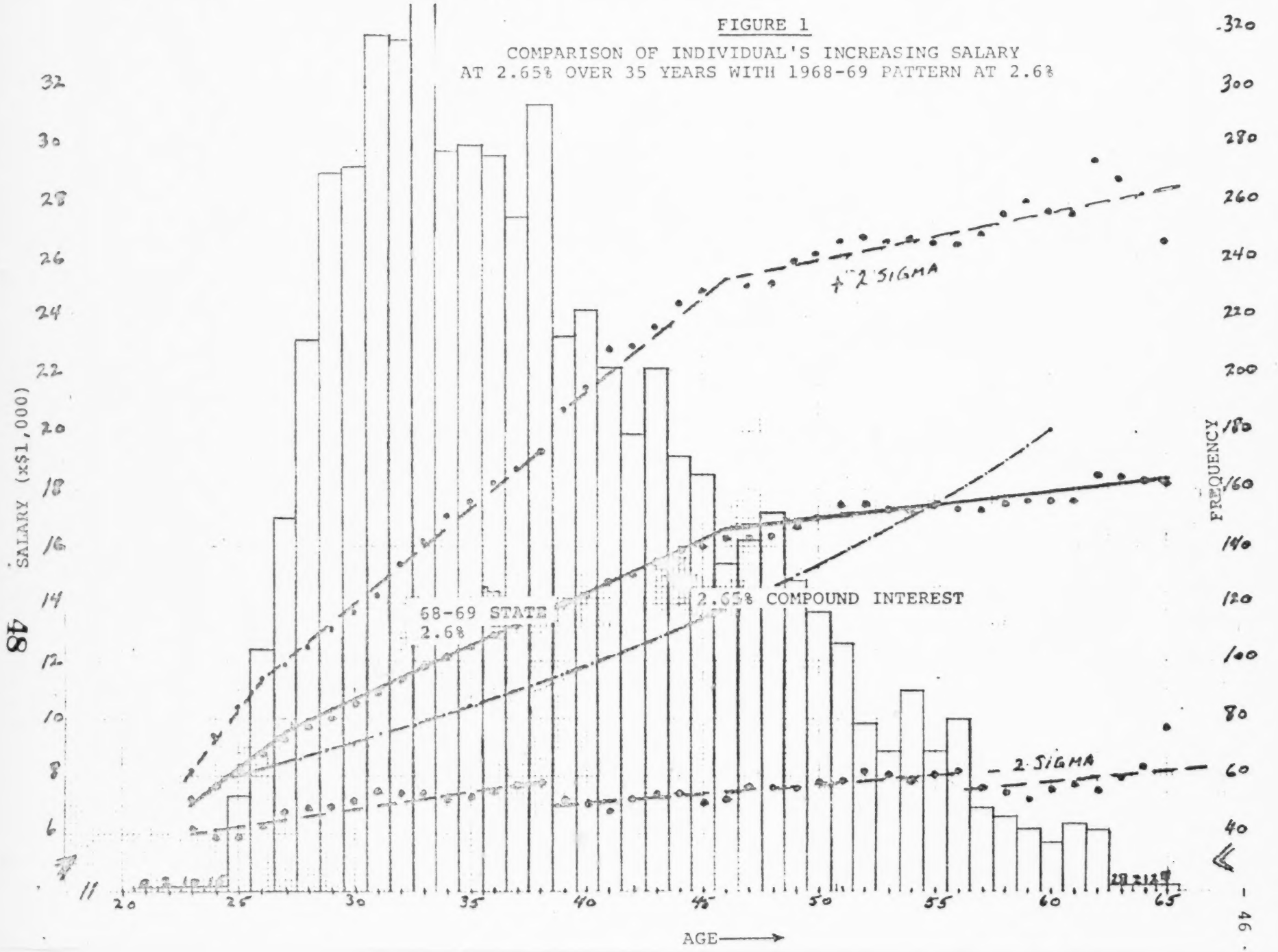


TABLE 1

CALCULATIONS OF AVERAGE ANNUAL INCREMENTS
BY AGE AND OVERALL AVERAGE INCREASE

DBS ONTARIO SALARY DATA 1968-69

AGE A	FREQUENCY N	MEDIAN SALARY* $	CHANGE $ Δ $	CHANGE % 100Δ	WEIGHTED CHANGE % $N_{A-1}100\Delta$
21	0	0			
22	2	6,900			
23	10	7,500	600	8.7	17.4
24	15	7,200	-300	-4.0	-40.0
25	53	8,100	900	12.5	187.5
26	105	9,000	900	11.1	588.3
27	149	9,500	500	5.6	588.0
28	212	9,700	200	2.1	312.9
29	270	10,000	300	3.1	657.2
30	271	10,400	400	4.0	1,080.0
31	310	10,900	500	4.8	1,300.8
32	309	11,300	400	3.7	1,147.0
33	325	11,500	200	1.8	556.2
34	277	11,900	400	3.5	1,137.5
35	281	12,100	200	1.7	470.9
36	276	12,500	400	3.3	927.3
37	256	13,300	800	6.4	1,766.4
38	294	12,300	-1,000	-7.5	-1,920.0
39	213	13,500	1,200	9.8	2,881.2
40	223	14,000	500	3.7	788.1
41	203	14,000			
42	179	14,700	700	5.0	1,015.0
43	202	15,300	600	4.1	733.9
44	171	15,000	-300	-2.0	- 404.0
45	165	16,000	1,000	6.7	1,145.7
46	135	16,000			
47	143	16,000			
48	153	16,000			
49	128	15,700	-300	-1.9	- 290.7
50	117	16,800	1,100	7.0	896.0
51	106	17,700	900	5.4	631.8
52	79	18,100	400	2.3	243.8
53	69	17,500	-600	-3.3	- 260.7
54	90	17,800	300	1.7	117.3
55	69	16,300	-1,500	-8.4	- 756.0
56	80	18,300	2,000	12.3	848.7
57	49	17,300	-1,000	-5.5	- 440.0
58	48	17,500	200	1.2	58.8
59	42	17,600	100	0.6	28.8
60	38	17,800	200	1.1	46.2
61	43	17,000	-800	-4.5	- 171.0
62	41	18,700	1,700	10.0	430.0
63	28	19,500	800	4.3	176.3
64	21	17,100	-2,400	-12.3	- 344.4
65	29	19,000	1,900	11.1	233.1
	6,279				16,385.3

*Computed to the nearest $100.

$$\frac{\sum(N_A 100\Delta)}{\sum N} = \frac{16,385.3}{6,279} = 2.6\%$$

ADDENDUM 1

THE RELATIONSHIP BETWEEN PERCENTAGE INCREASE IN THE TOTAL OF FACULTY SALARIES AND PERCENTAGE INCREASE IN THE AVERAGE SALARY OF CONTINUING FACULTY

The simplest way to express this relationship is in terms of the quantities p_C, p_A, p_T, p_B where:

$100p_C$ = % increase in the total of salaries for <u>continuing</u> faculty
(= % increase in average salary for continuing faculty)

$100p_A$ = % increase in total salaries for <u>all</u> faculty.

$100p_T$ = % of the total of this year's salaries released at the end of this year due to <u>terminating</u> faculty.

$100p_B$ = % of the total of next year's salaries received by staff who arrive at the <u>beginning</u> of next year.

Let S_1 and S_2 be the total of salaries for this year and next year, respectively.

Then

$$(1) \qquad S_2 = (1 + p_A)S_1$$

and

$$(2) \qquad S_2 = (1 + p_C)(S_1 - p_T S_1) + p_B S_2$$

Thus, substituting (1) into (2) for S_2,

$$(3) \qquad (1 + p_A) = (1 + p_C)(1 - p_T) + p_B(1 + p_A)$$

which may be written

$$(4) \qquad \frac{1 + p_C}{1 + p_A} = \frac{1 - p_B}{1 - p_T}$$

Note that, $p_C > p_A$ when $p_T > p_B$. It is not necessary that the actual amount of money released by retiring faculty be greater than the amount consumed by new faculty, provided $S_2 > S_1$, in order that $p_C > p_A$.

The formula (4) may be expressed in terms of salary amounts or averages for each group; for example,

$$p_B = \frac{\text{total salaries of new arrivals next year}}{\text{total salaries of all faculty next year}}$$

$$= \frac{\text{(Average salary of new arrivals next year) (no. of new arrivals next y}}{\text{(Average salary of all faculty next year) (no. of all faculty next yr.}}$$

Similar expressions may also be obtained for p_C, p_A, p_T and (4) can then be written in terms of total salaries, or in terms of average salaries (along with the frequencies that are associated with each average).

A convenient calculation for finding the difference between percentage increases to continuing staff and all staff is

$$(5) \qquad (1 + p_C)-(1 + p_A) = \frac{\{S_2-p_B S_2\}}{\{S_1-p_T S_1\}} - \frac{S_2}{S_1}$$

Note that $p_B S_2$ is the total amount paid to beginning faculty next year and $p_T S_1$ is the total amount paid to terminating faculty this year.

This expression defines the amount of the total percentage increase to continuing staff which results from flow into, through, and out of salary grades and which does not require new money, i.e. does not require an increase in the unit value.

PART B PROBLEMS IN INTERPRETATION OF FACTORS

Compensation for Increased Cost of Living

There has been vigorous representation that a simple adjustment of 4.4% on gross salary would not achieve the aim of compensating the individual for loss of purchasing power. The explanation lies in the difference between average and marginal rates of progressive income tax. Since the marginal rate is higher and tax tables are not adjusted annually for an inflation factor, the wage-earner will pay a higher rate of tax on the cost of living compensation, than on his base salary. Unless cost of living compensation is sufficient to cover the effects of income tax, the very real personal consequence will be that the individual is required to live on a reduced income. It can be shown that a person at $15,000 with standard deductions and an average number of dependents would require a compensation of 5.5% to provide a 4.4% after-tax value. Others would argue that the effect of this would be to defeat the progressive tax system and that taxes pay for social services which are forms of income.

It could be argued also that the most recent information on cost of living is the most appropriate. For example, the portion of the previous year which falls into the current academic and salary year shows a four-month before-tax average of 4.8%. Converted to an after tax value, using the same difference as between 4.4 and 5.5, the result would be roughly 6%. Of course, this calculation could be made variable to reflect higher taxes paid by senior staff. In this event the range of after-tax calculations might be from 5.5% to 6.5%.

Another point of view is that it is more proper to plug in the government's goals for the future as the value of this factor; if this is not done how can we ever hope to combat inflation? The effect of this would be to ask the academic community to accept a value which will in all likelihood not be accepted by other parts of society e.g., construction unions, automobile workers, steel workers, etc. Ultimately, government has control over monetary policy and if its policies result in a reduction of inflation to a level of say 3%, it will not find the academic community wanting in agreeing to accept such a reduction. In any case the repetitive aspect of this factor will cause the value of 3% to be used in representing this factor for the next period.

Share of Increasing National Wealth

The measure adopted in Part A for distributing a share in increasing national wealth was GNP per capita. It could be argued that the usual measure of productivity, GNP per employed person, should be the basis for returning society's dividends to the worker. The productivity measure is the one more commonly utilized in labour negotiations. Over the past several years, decreasing family size and an increase in the percentage of the population in the labour force have led to GNP increases per capita greater than per employed person. In an earlier period, the converse obtained; changes in the above factors could again cause a reversal of the relationship in future years. Thus, overall increasing national wealth per capita is a result of productivity improvements, population growth, and participation in the labour force. The per capita measure was utilized in Part A on the basis of the

argument that the rewards of all three factors should be passed on to the population.

A separate issue is the amount of society's increasing wealth which should be redistributed in any given year. An analogy to the firm suggests that only a portion of the profits is likely to be returned in the form of dividends, the rest being retained as savings to enable reinvestment which will result in future productivity gains. On the other hand, it can be argued that what is being proposed in using the actual percentage gain in per capita GNP for dividends is not the total amount of GNP increase, but only that portion attributable to the services sector, which would allow the remainder to be utilized for reinvestment.

We argued in Part A that the role of the professor in the development and dissemination of knowledge entitles him to at least an average share of increasing national wealth. This could be regarded as a conservative view, considering the magnitude of this contribution.

These are complex economic and philosophical issues which we acknowledge bear further examination, but we believe there are reasonable grounds for the measure used in part A.

Provision for Basic Career Progress

There has been discussion of the use of 2.6% annually as a basic factor for career progress. The question was raised as to whether part of this gain overlapped the gain in GNP. While this question cannot be answered with complete certainty, the pattern of distribution of mean staff salaries in 1968-69 from Figure 1 shows roughly $8,000 at age 25 and $18,000 at age 60, a 35 year gain

to 2.25 times beginning salary if individuals advance along the 1968-69 salary-age curve. Effects of both inflation and GNP gain are eliminated automatically by such a cross-sectional analysis. If an individual were to advance along this curve over a 35 year period in constant dollars his average annual increase would be 2.6%.

The goal of 2.5 times starting salary itself does not seem unreasonable. For example, the average university teacher starting out at $8,000 annually could advance in 35 years to $20,000 with the outstanding person realizing $28,000 to real terms and the marginal person say $12,000.

There is some disagreement about whether the so-called "merit" factor is a separate factor or really a part of a career progress. Certainly, a range of $12,000 to $28,000 for a full professor would seem to imply that "merit" and "market" factors are operating. The limits around the means in Figure 1 would seem to bear this out also. For example, the highest paid professor at age 40 is making 3 times the salary of the lowest paid man.

Merit

This is a factor which OCUFA has argued for in addition to basic career progress to provide increments for special meritorious service beyond ordinary progress. In effect the purpose of a special merit adjustment would be to change the shape of the mean salary curve in Figure 1. This would mean that entering salaries from age 23-26 would be increased and the curve would be steepened from age 45 to 65 which would make this stage of the professor's career more attractive than it is reputed to be now. There is

some question about whether the entire curve from 45 onward should be adjusted (a change in slope) or whether the dispersion of the underlying distribution should be modified (a change in variability). The limits shown are 3-plot moving averages of ± 2 standard deviations from the 3 piece curve of mean salaries. It should be pointed out also that this 3-piece curve is not mathematically fitted. The net effect of increasing the dispersion would be to increase the salary range within each age group so that some worthy professors would receive outstanding salaries. Examination of the parallel 2 sigma limits of age group 46 and beyond suggests that some flaring of these limits would be desirable.

Using the distribution of Figure 1, a rough calculation of the amount required to adjust the curve from 23 through 27 to the same slope as the following ages would be roughly $50,000 or less than 0.1%. The cost to steepen the slope of the curve from age 48 onward to exit at $20,000 would be roughly $1.3m or about 1.6%. The total increase from these two adjustments would be about 1.7%.

Adjustment of Level

This amounts to a shift of the entire curve upward after selective adjustment of the tails of the profile as above. It is easy to calculate the effect of shifting the whole curve by some amount. For example, the cost of an upward shift of the entire profile by $500 would be about $3.1m or about 3.7%.